CLAIMS

What is claimed is:

1. An exhaust nozzle for a gas turbine engine comprising:

a first portion having an interior surface converging in a downstream direction; and

a second portion having an interior surface downstream of the interior surface of the first portion, the second portion comprising a circumferentially arrayed plurality of flaps, each flap pivotally coupled to the first portion for articulation through a range of orientations,

wherein:

the interior surface of the second portion along each flap has a central longitudinal radius of curvature that from upstream to downstream has:

at least a first value along a first portion;

at least a second value, less than the first value, and between 0.25 inch and 1.0 inch along a second portion; and

at least a third value, less than the first value, and between 5.0 inches and 10.0 inches along a third portion.

2. The nozzle of claim 1 wherein said radius of curvature is:

essentially infinite along the first portion; and

continuously increasing from a low of between 0.25 inch and 5.0 inches to a high of between 8.0 inches and 14.0 inches.

3. The nozzle of claim 2 wherein said continuous increase occurs over a longitudinal span of between 2.0 inches and 3.0 inches.

4. The nozzle of claim 2 wherein said continuous increase occurs over a longitudinal span having a length of between 5% and 10% of a longitudinal flap length.

5. The nozzle of claim 1 wherein said range of orientations extends between:

a low mode orientation wherein a ratio of an exit area to a throat area is between 1.05:1 and 1.5:1; and

a high mode orientation wherein said ratio is larger than said ratio in said low mode orientation and between 1.3:1 and 2.0:1.

6. The nozzle of claim 5 wherein:

in the low mode orientation said ratio is between 1.1:1 and 1.3:1; and

in the high mode orientation said ratio is between 1.4:1 and 1.5:1.

7. The nozzle of claim 5 wherein:

between the low and high mode orientations, a throat radius changes by less than 0.5%.

8. The nozzle of claim 5 wherein:

between the low and high mode orientations, a throat radius changes by less than 0.2%.

9. The nozzle of claim 1 wherein:

each flap is pivotally coupled to the first portion for rotation about an associated hinge axis, said hinge axis having a first radial distance from a centerline of the nozzle and said flap having a longitudinal flap length from said hinge axis to an outlet end of said flap;

the second portion has a throat having a second radial distance from the centerline and a first longitudinal distance from said hinge axis; and

a ratio of said first longitudinal distance to said longitudinal flap length is between 0.05:1 and 0.20:1.

10. An exhaust nozzle for a gas turbine engine comprising:

an upstream portion comprising a plurality of circumferentially arrayed first flaps and having an interior surface converging in a downstream direction; and

a downstream portion comprising:

a plurality of circumferentially arrayed second flaps, each hinged relative to an associated one of the first flaps;

a downstream outlet; and

an interior surface downstream of the interior surface of the upstream portion,

wherein a longitudinal profile of said downstream portion interior surface has:

an essentially straight first portion;

a convex second portion downstream of the first portion and having a continuously increasing radius of curvature; and

an essentially straight third portion downstream of the second portion.

11. The nozzle of claim 10 further comprising a plurality of circumferentially arrayed third flaps, each outboard of and hinged relative to an associated one of the second flaps.

12. The nozzle of claim 10 wherein the radius of curvature of the second portion varies from an upstream value of between 0.25 inch and 0.5 inch to a downstream value of between 8.0 inches and 14.0 inches over an axial span of at least 2.0 inches.

13. A convergent/divergent exhaust nozzle for a gas turbine engine including a hinged pivot at the juncture of where the convergent portion and the divergent portion of said nozzle meet, said convergent portion comprising a plurality of circumferentially-spaced axially-extending flaps and said divergent portion having a plurality of circumferentially-spaced axially-extending flaps, a radiused

throat having a surface exposed to the working medium of the engine and being located downstream of the hinged pivot, the surface of said radiused throat being defined by a convex curvature formed on the flaps of the divergent portion and having a portion with a radius of curvature continuously increasing from upstream to downstream.